THE BENDING MODES OF YbOH PROBED BY VISIBLE SPECTROSCOPY

TIMOTHY STEIMLE, *School of Molecular Sciences, Arizona State University, Tempe, AZ, USA*; HAILING WANG, *Physics Department , East China Normal University , Shanghai, China*; EPHRIEM TADESSE MENGESHA, *School of Molecular Sciences, Arizona State University, Tempe, AZ, USA*; NICKOLAS PILGRAM, NICHOLAS R HUTZLER, *Division of Physics, Mathematics and Astronomy, California Institute of Technology, Pasadena, CA, USA*.

Ytterbium monofluoride, YbF, has long been used as a venue in attempts to measure the electron electric dipole moment (eEDM)[1−2] . In addition to the molecular EDM resulting from the eEDM contribution, the ^{173}Yb (16.1%, I=5/2) isotopic form of Yb-containing molecules are also expected to have an EDM caused by an interaction of a nuclear magnetic quadrupole moment (NMQM)[3] with the electrons. As pointed out by Kozyryev and Hutzler[4], the $X^2\Sigma^+(01^10)$ level of YbOH is expected to exhibit enhanced sensitivity for EDM measurements, relative to YbF, largely due to the ease of polarization. The degenerate bending vibrational levels of YbOH are poorly characterized[5]. Here we report on high-resolution studies of the molecular beam of the $A^2\Pi_{1/2}$- $X^2\Sigma^+$ (010-000) and $A^2\Pi_{1/2}$- $X^2\Sigma^+$ (010-010) transitions of YbOH. In addition, the dispersed fluorescence resulting from the excitation of rotationally resolved branch features has been analyzed to produce fluorescence branching ratios. Implications for planned EDM measurements will be presented.

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References:

1.Hudson, J. J.; Sauer, B. E.; Tarbutt, M. R.; Hinds, E. A., Phys. Rev. Lett. 2002, 89 (2), 023003/1-023003/4.

2.Tarbutt, M. R.; Sauer, B. E.; Hudson, J. J.; Hinds, E. A., New J. Phys. 2013, 15 (May), 053034/1-053034/17.

3.Lackenby, B. G. C.; Flambaum, V. V., Nucl. Theory 2017, 1-7.

4.Kozyryev, I.; Hutzler, N. R., arXiv.org, e-Print Arch., Phys. 2017, 1-11.

5.Melville, T. C.; Coxon, J. A., J. Chem. Phys. 2001, 115 (15), 6974-6978.